

Reassessment of '*Calcinus*' *astathes* Stebbing, 1924

(Crustacea: Anomura: Paguridea: Diogenidae)

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SYNOPSIS. A reexamination of the syntypes of '*Calcinus*' *astathes* Stebbing, 1924 in the collection of The Natural History Museum, London, U.K., has shown that although subsequently assigned correctly to the genus *Clibanarius*, this taxon is not conspecific with *C. virescens* Krauss, 1843, as was previously proposed at that time. *Clibanarius astathes* is redescribed and illustrated; a lectotype is designated.

INTRODUCTION

Stebbing (1924) described a new species of hermit crab from Delagoa Bay, South Africa, which he mistakenly assigned to *Calcinus* Dana, 1851. The fact that this species clearly should have been placed in *Clibanarius* Dana, 1852 was recognized by Barnard (1947); however, at that time he made only the notation that four specimens returned to the South African Museum by Stebbing were indistinguishable from *Clibanarius virescens* (Krauss, 1843). Barnard (1950) went on to define those four specimens further by commenting, 'I would not have ventured to dispute the identity of Stebbing's *Calcinus astathes* if there had not been four specimens returned to the Museum bearing Stebbing's autographic label (the largest and type specimen probably retained by him, or perhaps now transferred to the British Museum). These four specimens are obviously *C. virescens*. The dactyl of the 3rd leg is not longer than 6th joint, and has the characteristic shape'.

Stebbing's (1924) original description of *Calcinus astathes* specified only a 'group' of specimens collected from Delagoa Bay by K.H. Barnard on October 12, 1912. Five specimens, listed as syntypes of this taxon are part of the Stebbing Collection donated to The Natural History Museum (NHM) [formerly British Museum (Natural History)] by Barnard, although only three initially were listed in the Museum registry (NHM 1928.12.1.264–266). Four specimens, dry, and in poor condition, remain in the collection of the South African Museum (SAM) catalogued under the original number (A2121)

listed by Stebbing (1924). Barnard's hand written label accompanying the dry specimens reads 'A2121. Delagoa Bay 4 spec. returned by Stebbing labelled (*sic*) as '*Calcinus astathes*' also 1 with parasites see Stebbing, 1920'. Barnard's label reference to the parasitized specimen must refer to a specimen without chelipeds included by Stebbing (1920), with others (NHM 1928.12.1.267–268, SAM A3270 A2120), identified as *Calcinus laevimanus* (Randall, 1840), the former specimen similarly placed in synonymy with *C. virescens* by Barnard (1950: 435). No specimens of *Calcinus* or *Clibanarius astathes* were listed among the type collection in the South African museum by Kensley (1974), and none have been found on a recent search (Ms. L. Hoenson, pers. comm.).

Despite some confusion in the initial NHM registry entry for '*Calcinus*' *astathes*, at least two points are clear. These five specimens labeled as syntypes of Stebbing's (1924) species all belong to the same taxon; none are conspecific with *Clibanarius virescens*. The four specimens remaining in the SAM collection truly do represent *C. virescens*. The largest of the NHM specimens [and the one presumably unaccounted for by Barnard (1950)] is herein designated as the lectotype of '*Calcinus*' *astathes*.

MATERIAL AND METHODS

In addition to the syntypes, and Barnard's four specimens of *Clibanarius virescens*, comparative material of a

morphologically similar *Clibanarius* species, *C. longitarsus* (De Haan, 1849) from Durban Bay, S.A., has been examined. One measurement, shield length (SL), measured from the tip of the rostrum to the midpoint of the cervical groove provides an indication of specimen size. The type material of *C. astathes* has been returned to the Natural History Museum, and Barnard's *C. virescens* to the South African Museum. Two specimens of *C. longitarsus* used in the comparison also have been deposited in The Natural History Museum (NHM 1995.163–164), the remaining have been retained in the author's personal collection.

SYSTEMATIC ACCOUNT

Clibanarius astathes (Stebbing, 1924)

Figs 1, 2

Calcinus astathes Stebbing, 1924: 239, pl. 2 (CXVII of continuing series). *Clibanarius virescens*: Barnard, 1947: 376 (in part); 1950: 435 (in part). Lectotype (herein selected). Female (SL = 7.3 mm), NHM reg. 1928.12.1.264 Paralectotypes. Two females (SL = 6.3, 6.3 mm), 2 males (SL = 5.8, 6.9), NHM reg. 1928.12.1.265–266.

TYPE LOCALITY. Delagoa Bay (25°50'S, 32°50'E), 'Mosambique', Ethiopian region, Indian Ocean, 1912.

DIAGNOSIS. Rostrum with simple or bifid termination. Ocular peduncles 0.66–0.75 length of shield; little if at all overreached by antennular peduncles; antennal peduncles not reaching to bases of corneae. Ocular acicles with acute, simple or bifid termination. Basal segment of antennular peduncle with 1 or 2 small spines.

Chelipeds subequal, right somewhat larger. Right cheliped with dactyl equal to or slightly longer than palm; dorsomesial margin and dorsal surface with rows of corneous-tipped spines. Dorsomesial margin of palm with row of low spines and tufts of long setae, second adjacent row of spines and one large tubercle at proximal margin, dorsal surface sloping, with few spines distally and on proximal portion of fixed finger. Dorsomesial distal angle of carpus with acute spine, low protuberances and tufts of setae on dorsomesial margin. Merus with few low, somewhat spinulose protuberances on ventromesial margin; ventrolateral distal angle with three acute spines. Left cheliped with few more spinules on dorsal surface of palm. Carpus with two strong corneous-tipped spines on dorsomesial margin and blunt protuberance in line with tubercle on proximal margin of palm. Ventromesial margin of merus with row of few small spines or two small spines distally; lateral face with two spines at ventrolateral distal angle.

Ambulatory legs similar from left to right. Dactyls approximately 1.5 times longer than propodi; dorsal surfaces flattened; ventral margins each with row of minute corneous spinules (10–13 in distal half and one or two proximally). Lateral faces of propodi each with very strongly developed dorsolateral margin; dorsal surfaces somewhat flattened; ventrolateral distal angles each with one or two spines. Carpi each with spine at dorsodistal angle. Meri each with acute spine at ventrolateral distal angle. Sternite of third pereopods with subrectangular anterior lobe, anterior margin slightly rounded. Fourth pereopods each with acute spine at dorsodistal margin of carpus.

Telson with slightly asymmetrical posterior lobes, separated

by small median cleft; terminal margins each with three to five small spines, larger on left.

REDESCRIPTION

Shield longer than broad; anterior margin between rostrum and lateral projections straight or very faintly concave; anterolateral margins sloping; posterior margin roundly truncate. Dorsal surface of shield with scattered setae and distinct 'Y'-shaped suture medianly in posterior portion. Rostrum triangular, terminating acutely or minutely bifid, overreaching lateral projections. Lateral projections broadly rounded or obtusely triangular, with terminal spinule or blunt small projection.

Ocular peduncles slender, 0.66–0.75 length of shield, with scattered setae dorsally and mesially; corneae not dilated. Ocular acicles narrowly triangular, dorsally rounded (convex), with simple or bifid acute termination; separated by less than basal width of one acicle and tending to become approximate distally.

Antennular peduncles overreaching distal margin of corneae little if at all. Ultimate and penultimate segments with scattered setae. Basal segment with one or two very small spinules on ventrolateral distal margin.

Antennal peduncles reaching approximately to bases of corneae; with supernumerary segmentation. Basal segment without spine on laterodistal margin, but with acute spine on ventrodistal margin laterally. Second segment with dorsolateral distal angle produced, with small terminal spine, dorsomesial distal angle rounded. Third segment with small spine on ventrodistal margin. Fourth and fifth segments with scattered setae. Antennal acicle reaching almost to distal margin of fourth peduncular segment, triangular, armed on mesial margin with one to three spines and tufts of setae, terminating in acute spine. Antennal flagellum overreaching chelipeds, and approximately as long as ambulatory legs; each article with two or three minute bristles.

Chelipeds subequal, right somewhat larger. Right cheliped with dactyl equal to or slightly longer than palm; dorsomesial margin with row of corneous-tipped spines, dorsal surface with two rows of appreciably stronger, corneous-tipped spines; surfaces all with numerous tufts of moderately long setae; cutting edge with two prominent calcareous teeth in proximal half and broad terminal corneous hoof-shaped claw. Palm slightly longer than carpus; dorsomesial margin with row of low spines and tufts of long setae, second adjacent row of spines and one large tubercle at proximal margin, dorsal surface sloping, with no delimitation of dorsolateral margin, surface with few spines distally and on proximal portion of fixed finger, also with tufts of long setae; fixed finger with two rows of small spines on dorsal surface, all surfaces with tufts of long setae; cutting edge with three calcareous teeth in proximal half, distal-most strongest; terminating in corneous hoof-shaped claw. Carpus slightly more than half length of merus; dorsomesial distal angle with acute spine, low protuberances and tufts of setae on dorsomesial margin; dorsal surface with indications of points of original tufts of setae (no longer present), dorsolateral margin not delimited; mesial face with few scattered tufts of setae. Merus subtriangular; dorsal margin with tufts of setae; ventromesial margin with few low, somewhat spinulose protuberances and tufts of setae; ventrolateral distal angle with three acute spines, ventrolateral margin proximally and lateral

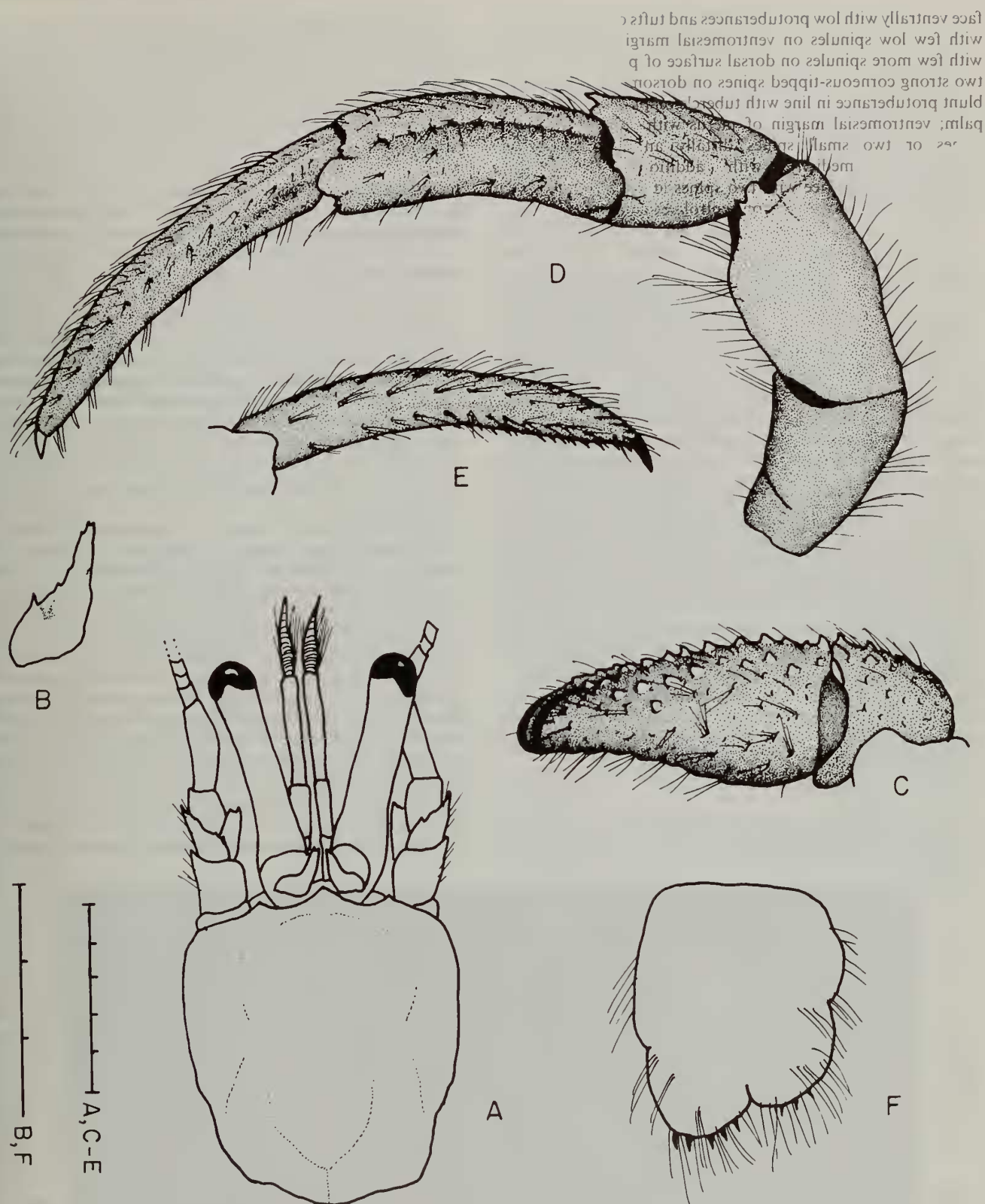


Fig. 1 *Clibanarius astathes* (Stebbing, 1924), A-E, female lectotype (7.3 mm); F, male paralectotype (6.9 mm). A, shield and cephalic appendages; B, right second antennal peduncular segment enlarged; C, carpus and chela of left cheliped (lateral view); D, third left pereopod (lateral view); E, dactyl of third left pereopod (mesial view); F, telson. Scales equal 5.0 mm (A, C-E) and 3.0 mm (B, F).

face ventrally with low protuberances and tufts of setae. Ischium with few low spinules on ventromesial margin. Left cheliped with few more spinules on dorsal surface of palm; carpus with two strong corneous-tipped spines on dorsomesial margin and blunt protuberance in line with tubercle on proximal margin of palm; ventromesial margin of merus with row of few small spines or two small spines distally and two, plus low protuberance, medially, with additional protuberance proximally; lateral face with two spines at ventrolateral distal angle and low protuberances on ventrolateral margin.

Ambulatory legs similar from left to right. Dactyls approximately 1.5 times longer than propodi; in dorsal view straight, in lateral view slightly curved; dorsal surfaces flattened, and with rows of tufts of stiff setae, lateral faces each with longitudinal row of tufts of stiff setae; ventral margins with row of tufts of stiff setae and row of minute corneous spinules, 14 (spaced distally to proximally 8,5,1) on left third (lectotype), right third with 10, left second with 13, all in distal half; paralectotypes usually with 10–13 spinules in distal half and one or two proximally. Propodi slightly less than twice length of carpi; lateral faces each with distinctly developed dorsolateral margin and tufts of setae; dorsal surfaces somewhat flattened and with numerous tufts of setae; ventrolateral distal angles each with one or two spines, ventral margins with tufts of setae. Carpi 0.66 to 0.90 length of meri; each with spine at dorsodistal margin and tufts of setae on dorsal and lateral faces. Meri with tufts of setae dorsally and ventrally; ventrolateral distal angles each with one acute spine and ventral margins of second also with low protuberances. Ischia with tufts of setae on ventral margins. Fourth pereopods each with acute spine at dorsodistal margin of carpi. Sternite of third pereopods with subrectangular anterior lobe, anterior margin slightly rounded. Uropods asymmetrical. Telson with transverse suture; posterior lobes slightly asymmetrical, separated by small median cleft; terminal margins each with three to five small spines, larger on left.

COLOUR. Unknown.

DISTRIBUTION. At present recognized only from the type locality, Delagoa Bay, South Africa.

AFFINITIES. *Clibanarius astathes* shares with *C. padavensis* De Man, 1888, dactyls of the ambulatory legs that are longer than the propodi. Barnard (1926) listed the latter species from Delagoa Bay, and subsequently (Barnard, 1950) gave a brief diagnosis of that species. The ratio of cornea diameter to ocular peduncle length cited by Barnard is less than that given by De Man (1888) in his original description, or later by Alcock (1905), and the illustrated propodus of the left third pereopod (Barnard, 1950: fig. 80d) is appreciably shorter and stouter than that described for *C. padavensis*. However, if the colour patterns described by Barnard actually were taken from his specimens, one must assume that his identification was correct, and that *C. astathes* and *C. padavensis* exist sympatrically in the Delagoa area.

I have not had the opportunity to examine Barnard's (1950) specimen(s) of *C. padavensis*, nor other specimens of this species; however, De Man's (1888) very detailed description points to several characters that would distinguish *C. padavensis* from *C. astathes* in the absence of colour. These include longer and more slender ocular peduncles; multispinose ocular acicles; longer antennal acicles, which reach beyond the proximal margins of the penultimate peduncular segments; longer and more slender chelae; and subcylindrical propodi of the ambulatory legs.

Clibanarius astathes also bears a very strong resemblance to *C. longitarsus*. *Clibanarius astathes* differs from the Durban Bay population of *C. longitarsus* (12 males, 3 females, SL = 1.9–10.4 mm) that I have examined, in having: 1) fewer spines on the ventrolateral distal margin of the antennular peduncle (one or two, as opposed to three to six in *C. longitarsus*); 2) two strong corneous-tipped spines on the dorsomesial margin of the carpus of the left cheliped (only one was observed in numerous specimens of *C. longitarsus* of varying sizes); 3) strongly delineated dorsomesial propodal margin on the third pereopod (rounded or very faintly ridged in *C. longitarsus*); 4) roundly rectangular anterior lobe on the sternite of the third pereopods (this lobe is subquadrate, and often with a central blister-like protuberance in *C. longitarsus*). Other characters, such as the rows of spines on the fixed finger of the left cheliped, the armature of the ventral margins of the meri of the chelipeds, the



Fig. 2 *Clibanarius astathes* (Stebbing, 1924), male paralectotype (6.9 mm). A, left cheliped; B, right cheliped. Scale equals 12 mm.

presence of a spine at the ventrolateral distal angle of the merus of the third right and left pereopods, the number and spacing of the corneous spinules on the ventral margins of the ambulatory dactyls, and the spination of the terminal margins of the telson appear quite variable in *C. longitarsus*. Too few specimens of *C. astathes* are known for any evaluation of morphological variation.

REMARKS. Stebbing's (1924) comments on the genus *Calcinus* emphasized as did his earlier remarks (Stebbing, 1914), the development of the maxillipeds, which seems to suggest that he was not really familiar with the overall morphology of *Calcinus* species. Finding similar maxillipedal development in his new taxon, Stebbing (1924) assigned *astathes* to this genus, with apparent disregard for the numerous characters which set *Clibanarius* apart from *Calcinus*.

It also would appear that the telson of the specimen he described and illustrated (Stebbing, 1924: 240, pl. 2T) was not closely examined, as it was characterized and depicted as being a simple plate with a smoothly rounded terminal margin. In actuality, the telson has a slight transverse suture dividing it into anterior and posterior lobes; the posterior lobes are separated by a small median cleft, and the terminal margins each have a few distinct spines.

Barnard (1950) was correct to transfer Stebbing's (1924) taxon to *Clibanarius*, although this transfer was obscured by his placement of the species in synonymy with *C. virescens*. *Calcinus astathes* Stebbing, 1924 was still listed by Gordan (1956) in her comprehensive tabulation of hermit crab species, and more recently was included by Morgan (1991) in his world-wide listing of known *Calcinus* species. Barnard's (1950) decision regarding the conspecificity of *Clibanarius astathes* and *C. virescens* appears to have been based on specimens incorrectly labeled by Stebbing, and not on the actual type material of *C. astathes*. Not only the fact that the Natal-Mozambique areas of South Africa are type localities of both species, but also the inadequacy of Stebbing's (1924) original description and illustrations, undoubtedly account for Barnard's (1950) synonymy having been accepted, without question, by subsequent carcinologists.

One of the principal characters upon which Barnard (1950) based his identification of *C. virescens* was the shortness of the dactyls of the third pereopods in relation to the propodi, although, as pointed out by Lewinsohn (1982), this character was not mentioned in Krauss' (1843) original description of the species. Not only Barnard (1950), but Fize and Serène (1955), and Gherardi and McLaughlin (1994) reported that the dactyls of their specimens were shorter than the propodi; however, Buitendijk (1937), Miyake (1978), and Lewinsohn (1982) described the dactyls and propodi as being equal in length. Rahayu and Forest (1993) found the dactyls longer than the propodi in small specimens, but shorter in large specimens. Stebbing (1924), like Krauss (1843), made no mention of the length ratios of the dactyls and propodi of the ambulatory legs of *C. astathes*.

Despite the variations in this major diagnostic character observed in *C. virescens*, *C. astathes* sensu stricto differs markedly from Krauss' (1843) taxon. The dactyls of the ambulatory legs of *C. astathes* are approximately half again the length of the propodi. Additionally, the ventral margins of the ambulatory dactyls are armed with 10 to 14 tiny corneous spinules in *C. astathes*, in contrast to the five to eight strong corneous spines seen in *C. virescens*. As previously indicated, *C. astathes* bears a far greater similarity to that group of

Clibanarius species characterized by long pereopodal dactyls and very short antennal acicles.

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